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FOOD PRESERVATIVES—HOW FAR ARE THEY INJURIOUS TO HEALTH ?

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IT is well known that we have now on our statute-books laws which prohibit the use of various substances as adulterants. Many of the substances may be classed as food preservatives. Outside the public, there is no class of people more interested in legislation in this direction than the pharmacist and physician.

Legislation in different countries and different parts of the United States concerning the employment of these substances has been of varying character, prohibiting in some parts what is allowed in others, and those local regulations, often contradictory, have emphasized the necessity of a bureau in Washington for an investigation which shall establish certain principles concerning the use or prohibition of these substances. This bureau not only analyzes chemically, microscopically and otherwise samples of food and drugs offered for sale, but by investigation determines how far the modern and other chemical preservatives are deleterious. In a recent bulletin of the Department of Agriculture, Bureau of Chemistry (Circular No. 15) the excellent work of this department is set forth. It may be said in passing that this circular shows the result of the physiological investigation regarding the use of borax and boric acid as a preservative upon digestion, etc.

The object of the present paper is to call attention to the possible undue antagonism against many of the new antiseptics furnished by organic chemistry, having, as they are used, little toxicity. We will cite but two, salicylic acid and benzoic acid. Doctor Biglow, of the Bureau of Food Investigation, at Washington, says of the former—salicylic acid :

“It has been used chiefly to preserve fruit and vegetable products. In following the directions of dealers in food preservatives, an ounce of salicylic acid or sodium salicylate is added to from 400 to 600 pounds (50 to 75 gallons) of liquids, and from two to three times that amount to pasty or semisolid substances. . . . Owing to the early exploitation of salicylic acid as a food preservative, and the well-known indifference which characterizes both legislative bodies and the general public regarding the wholesomeness of foods, the use of

salicylic acid became so common at one time that chemists of many boards of health still test for no other preservative."

Some of the inorganic substances, such as boric acid, have also been found suitable as preservatives. Doctor Leffman calls attention to these as having the merits of cheapness, of not producing color in the amount needed, of having no odor or appreciable taste when added to the material to be preserved. Each substance has its preferable applications.

The common prejudice seems to be against all new antiseptics as being not only unwholesome but poisonous, but we are inclined to the belief that this is an exhibition of conservatism which may impede progress—a spirit that assumes all the preservatives of ancient origin to be safe and all of modern origin to be unsafe.

It cannot be said, says Doctor Leffman, that the prejudice existing against some of the new preservative agents is founded upon a scientific basis. The experimental data are not extensive, and are somewhat one-sided; the investigations have been made with the modern, or, as they have sometimes been called, chemical preservatives. If we accept freely the published results, we can say, I think, merely that a limited amount of disturbance of function may be attributed to most of the modern antiseptics.

The question, in my opinion, cannot be considered as placed on a scientific basis until all forms of preserved foods have been studied carefully in comparison. It is probable that all forms of preserved foods are less wholesome than fresh. Even the cooking of proteid foods diminishes their digestibility. Drying, salting, smoking and pickling have probably still more unfavorable effects. Experiences among those who make long journeys away from the comforts of civilization, who must rely on food preserved in any manner, show amply that fresh materials have some special nutritive quality that is not long retained. This fact is abundantly exemplified in the history of navigation and in recent experience of Alaskan pioneers.

Doctor Eccles (Am. Jour. Phar.) says: "Every intelligent man is an advocate of pure-food laws and of their enforcement; however, all do not agree as to what constitutes pure foods. There is an idea among people generally that food preservatives are as a rule deleterious to health; this prejudice is to be accounted for because it has been so widely proclaimed that any form of preservative added to food products is a poison. This, as every scientific man knows, is a false position to take. We see around us every day the evil effects of foods that do not contain preservatives. It is true preservatives may be somewhat harmful, but not to the same extent as decayed foods. Salicylic, benzoic and boric acids have been used for over twenty years, yet there cannot be found a single recorded case of any one

having been injured by food containing them, while, on the other hand, thousands have been killed by using food that did not contain preservatives.

The pure-food laws controlling the use of these preservatives are in their infancy, and, so far as they aim to accomplish salutary effect, should be enforced. It is an undisputed question that there is no real harm done in the use or abuse of the preservative substances, but we question whether most of the real harm does not arise from the use in fraudulently manipulating inferior products so as to enable the seller to obtain a price of a much higher class of goods. These remarks especially apply to articles other than preservatives, such as aniline colors used in articles of food and drink; these colors being confined principally to the reds, yellows, and browns, and are somewhat easily detected by the well-known property of these colors to dye fat-free woolen goods. If the coloring matter be of fruit or vegetable origin, such material will be either uncolored or changed slightly; if coal-tar or aniline color be used, the woolen material will take color readily.

To any one who is interested in the subject of food control by the United States, it would be most profitable reading to take the report of 635 pages issued by the government relating to the "hearings before the committee of interstate and foreign commerce of the house of representatives on the pure-food bills." In this report it will be found that a great deal of the testimony in regard to the effects of many of the preservatives is based upon purely theoretical grounds; for example, it is stated that salicylic acid is injurious to the organs of secretion; if its use be continued, that it retards digestion. Many statements are made, and confessed not to be from any personal experimentation.

An American leader in the war against preservatives says: "There is no preservative that paralyzes the ferments which create decay that does not at the same time paralyze to the same extent the ferments that produce digestion. The very fact that any substance preserves food from decay shows that it is not fit to enter the stomach." It is this kind of reasoning that has led to the swearing in court that salicylic acid is dangerous to health and a poison. Salicylic acid has been chosen as the special target of attack because of one especial reason of its familiar antagonistic action to ferments; but let us remember its methyl ester is found in hundreds of plants from the most diverse botanical orders. Most fruits contain it. Nature has thus put it into our foods. In this respect it is like benzoic acid. Doctor Eccles says, in relation to toxicity of preservatives to be classed with salicylic acid: "I defy any one, if he dares to claim that vinegar is not a poison, to put the matter to the test of a public experiment with me. If vinegar is a poison, then the court's rulings,

if consistent, make it a crime for any person to add vinegar to any kind of food. The acid of vinegar in its pure state is, according to the best authorities in therapeutics, eight times stronger than salicylic acid in its pure state. Is it just to punish the men who use the weaker substance and permit those who use the stronger to escape unscathed? In all standard works on therapeutics the acids of most all fruits are considered much stronger than salicylic acid; then if we consider the one a poison we must consider the other in the same degree. In their strongest condition, boric, benzoic and salicylic acids are much weaker than many of the substances used daily in our food, as in essences, spices, etc. No one will deny that salicylic acid when used in even small quantities will not only disturb digestion but may actually inflame the kidneys, and in very susceptible persons may produce delirium and convulsions; it also depresses the heart; but while we are aware of these effects regarding the use of the pure acids as a preservative in prescribed quantities similar to that of acetic acid, oil of smoke, etc., it would be harmful, our experience has been that salicylic acid is of much value in the preservation of the flavor of fruit juices, such as raspberry, strawberry, etc., from which the fruit syrups are frequently made for use at soda-fountains, and in other ways."

"Our results* tend to show that if 0.3 grams be added to a quart (twenty-seven fluid ounce) bottle of fruit juice, such as strawberry or raspberry, it will keep this fluid retaining its flavor, etc., very much better than if the fruit juice be bottled by the ordinary sterilizing process without the use of salicylic acid. Fruit juice bottled in each of the two ways has been kept for over a year, and then from this liquid syrups have been made; the one preserved with salicylic acid has a better flavor and is in every respect a better article. Now the question is, What harm may arise from the use of salicylic acid in this way? Let us estimate the quantity of salicylic acid that one would obtain in an ordinary tumbler of water flavored with raspberry syrup. To the half-pint tumbler let us say there would be added 50 cc. of raspberry syrup, not over one-third of this having been treated with salicylic acid. Therefore, as there was added to the original juice 0.3 grams to about 800 cc. of fluid, there would be contained about six milligrams of salicylic acid. The physiological dose of this acid is stated by our best authorities to be from 0.3 to 4 grams. So it would be seen that it would take a gallon, at least, of the syrup to make a respectable minimum dose of the preservative."

Doctor LeWall, speaking of salicylic acid as used in some of the jel-

*See "Use and Abuse of Food Preservatives," Year-book of Department of Agriculture, 1900, page 558. It should be stated in this connection that in his report Doctor Biglow gives an extensive list and the composition of commercial food preservatives.

lies as a preservative, says: "It would no doubt surprise many that an ordinary wintergreen lozenge contains as much salicylic acid (combined as methyl salicylate) as the average tumbler of jelly which has been preserved with this substance, but such is certainly the case, as any one who desires may verify for himself."

In this paper we have but briefly touched upon this very important question. The preservation of foods is now in many countries a gigantic industry; even the manufacture has reached such dimensions as to be too great for any one person to review. Our civilization has reached the point where it is absolutely necessary to protect the public against the harmful effects of decayed foods, and many things point to the great importance of the trade in preserved foods; hence, the importance of the study by the unprejudiced scientists of the exact value. What we are demonstrating as food preservatives have also a much wider and possibly more important application, viz., in the preservation of certain remedial agents; for example, in the anti-toxic serums. In the anti-diphtheritic serums, a serum separated from the coagulated blood of a horse immunized through the inoculation of diphtheritic toxin must be preserved. The common preservative for the liquid is tricresol, which is a mixture of meta-, para- and ortho-cresol. Here we have a liquid which is injected hypodermically; fatal results would occur, perhaps, if this liquid were not preserved by antiseptic. The antiseptic employed is one which the food commissioners would say was dangerous, but in the quantities required it becomes entirely innocent, and a great protection to humanity.

We believe that all preservatives from a certain point-of view must be more or less harmful. We are not prepared to believe that foods in general can be preserved without them. If there should be such a necessity, then the investigation concerning the relative toxicity of these preservatives is of far greater importance to the public than the unwarranted crusade against the use of them or the unqualified condemnation of them all. If it be found in any given case that a food preservative is necessary for a stored food, then the quantity and kind of preservative employed should be plainly stated on the package containing said preserved food.